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Research Article

A List of Diaspididae in the Insect Collection of Taiwan Agricultural Research Institute (TARI) (4): Fioriniinae (Hemiptera: Coccoidea: Diaspididae)

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Abstract

Chen, S. P., J. Y. Wong, and H. C. Ku. 2025. A list of diaspididae in the insect collection of Taiwan Agricultural Research Institute (TARI) (4): Fioriniinae (Hemiptera: Coccoidea: Diaspididae). J. Taiwan Agric. Res. 74(1):25–36.

A list of 20 species in 3 genera of Fioriniinae (Hemiptera: Coccoidea: Diaspididae) with 145 slide-mounted specimens deposited at the Insect Collection of the Taiwan Agricultural Research Institute (TARI) is provided. The specimens were mainly collected during the Japanese Colonial Period. Synonyms, host plants, location data, and photographs of slide-mounted specimens are also provided for each species.

Key words: Fioriniinae, Takahashi, Taiwan.

INTRODUCTION

Scale insects (Coccoidea) of Taiwan have been extensively studied by several Western and Japanese entomologists, such as Green, Ferris, and Takahashi, since 1923 (Tao 1978). This is the fourth report of the Diaspididae catalogue series at the TARI. The first three reports treated Aspidiotinae, Chionaspinae, and Diaspidinae (Chen *et al*. 2013, 2014, 2016). Most of the slide-mounted specimens of Fioriniinae (Diaspididae) collected by Takahashi were deposited at the Insect Collection, Division of Applied Zoology, Taiwan Agricultural Research Institute (TARI), including several types. However, many species names used by Takahashi have been changed or synonymized with other names. In this study, the taxonomic status of all slide-mounted specimens in TARI was examined and revised based on the current studies.

MATERIALS AND METHODS

A total of 145 slide-mounted specimens were examined by using a Leitz DMRB light microscope (Leica, Milton Keynes, UK) in this study. Location data of each species were compiled based on the information provided on the slide-mounted specimens deposited at the TARI Insect Collection. Photographs of slide-mounted specimens (adult female) were taken by using a Leitz DMRB light microscope, Automatic Piezo stepping motor (Leica Piezo Z-drive, Leica, Glattbrugg, Switzerland), and Leica DFC 420 Digital Microscope Cameras (Leica, Glattbrugg, Switzerland) for each species. The spelling of localities followed according to Chu & Yamanaka (1973, 1974, 1975).

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RESULTS

Among the 20 species (3 genera) of Fioriniinae in TARI, there were 8 species described by Takahashi, 5 species by Maskell, 3 species by Green, 2 species by Kuwana, and 2 species by Cockerel and Targioni-Tozzetti, respectively. Five species were not collected from Taiwan, including *Fiorinia payaoensis* Takahashi, *Fiorinia pinicola* Maskell, *Unachionaspis bambusae* (Cockerell), *Unachionaspis signata* (Maskell), and *Unachionaspis tenuis* (Maskell). The following list provides comprehensive information on each species' nomenclature, synonymies, host plants, and distribution. Type specimens (female) with deposited labels (for example, #27-4-2-1) were recorded. Table 1 is a checklist of the old name and current names of collection locality records included in the paper (Chu & Yamanaka 1973, 1974, 1975).

Fiorinia ficicola (Takahashi, 1931) (Fig. 1A)

(Takahashi 1931b; Takagi 1970; Chou 1982; Tao 1989, 1999; García Morales *et al*. 2016; Normark *et al*. 2019)

Original spelling on the label: *Fiorinia ficicola* Takah. (7 slides)

Location data on the slides: Taiwan (Taihoku: Shinten).

Host plant recorded on the label: *Ficus foveolata* (Moraceae).

Syn.: *Adiscofiorinia ficicola* Takahashi, 1931; *Ichthyaspis ficicola* (Takahashi, 1931)

Note: Syntypes, female (collected from Taiwan: Taihoku, Shinten, on *Ficus foveolata*, 14-VI-1931, by R. Takahashi (#27-2-3-1~5)).

Fiorinia fioriniae (Targioni Tozzetti, 1867) (Fig. 1B)

(Targioni Tozzetti 1867; Cockerell 1893; Borchsenius 1966; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia fioriniae* Targ. (21 slides)

Location data on the slides: Taiwan (Heito: Kuraru; Kagi; Taihoku: Maruyama, Shirin, Taihoku; Taito: Seisui; Takao; Urai); Thailand (Mt. Sutep).

Host plant recorded on the label: *Cinnamomum* sp., *Machilus* sp. (Lauraceae); *Eucalyptus* sp. (Myrtaceae); *Ficus* sp. (Moraceae); Mango, *Buchanania sessilifolia* (Anacardiaceae); *Thea japonica* (Theaceae).

Syn.: *Diaspis fioriniae* Targioni Tozzetti, 1867; *Chermes arecae* Boisduval, 1868; *Fiorinia camelliae* Comstock, 1881; *Uhleria camelliae* (Comstock, 1881); *Uhleria fioriniae* (Targioni Tozzetti, 1867); *Fiorinia fioriniae* (Targioni Tozzetti, 1867); *Fiorinia palmae* Green, 1896; *Parlatoria fioriniae* (Targioni Tozzetti, 1867); *Parlatoreopsis camelliae* (Comstock, 1881).

Fiorinia formosensis Takahashi, 1933 (Fig. 1C)

(Takahashi 1933; Chou 1982; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia formosensis* Takahashi, 1933. (7 slides)

Location data on the slides: Taiwan (Taihoku: Kanko, Shinten).

Host plant recorded on the label: *Ficus* sp. (Moraceae).

Note: Syntypes, female (collected from Taiwan: Shinten, on *Ficus* sp., 05-IX-1932, by R. Takahashi (#27-4-2-1~27-4-3-2)).

Fiorinia hisakakii Takahashi, 1936 (Fig. 1D)

(Takahashi 1936, 1956; Borchsenius 1966; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia vaccini* var. *hisakakii* Takahashi, 1936. (3 slides)

Location data on the slides: Taiwan (Takaoshu: Chushinron, Chushinron near Rokki)

Host plant recorded on the label: *Eurya* sp. (Theaceae).

Syn.: *Fiorinia vaccini hisakakii* Takahashi, 1936; *Fiorinia euryae hisakaki* Takahashi, 1956.

Note: Syntypes, female (collected from Taiwan: Takao, Chushinron, near Rokki, on *Eurya* sp., 19-V-1935 by R. Takahashi (#29-5-2-1~29-5-2-3)).

Table 1. A checklist of the old name, current name and Chinese name of collection localities included in the paper.

Old name	Current name	Chinese name
Chushinron near Rokki	Kaohsiung: Paoshan near Liouguei	高雄：寶山 近 六龜
Dakusui	Yilan: Zhuoshui (Datong)	宜蘭：大同：濁水
Habon	Nantou: Holuan	南投：合巒
Heito	Pingtung	屏東
Hinokiyama	New Taipei City: Kuaishan	新北市：檜山
Hori, Horin	Nantou: Puli	南投：埔里
Hsintien	New Taipei City: Xindian (Sindian)	新北市：新店
Inrin	Changhua: Yuanlin	彰化：員林
Kagi	Chiayi	嘉義
Kaho	Taoyuan: Hsiapu	桃園：下埔
Kahodai	Taichung: Jiabaotai (Chiapaotai)	臺中：佳保台
Kakayo, Kakayom	Taitung: Jiadai (Chiachiadai)	臺東：嘉代 (嘉嘉代)
Kanko	New Taipei City: Gangou (Kankou)	新北市：乾溝
Kinnos near Nano	Yilan: Chihoau	宜蘭：基戛央
Kuraru	Pingtung: Sheding	屏東：社頂
Maruyama	Taipei: Yuanshan	臺北：圓山
Mato	Tainan: Madou	臺南：麻豆
Musha	Nantou: Wushe	南投：霧社
Mutosan	Pingtung: Wutoushan	屏東：霧頭山
Rirei near Kurasu	Taichung: Lileng near Sungho	臺中：裡冷 近 松鶴
Seisui	Taitung: Qingshui (Chingshui)	臺東：清水
Shin-Taiheizan	Yilan: Taiping Mountain (Taipingshan)	宜蘭：太平山
Shinten	New Taipei City: Xindian (Sindian)	新北市：新店
Shirin	Taipei: Shilin	臺北：士林
Shoka	Changhua	彰化
Sozan	Taipei: Yangmingshan	臺北：陽明山
Suisha	Nantou: Shuishe	南投：魚池：水社
Taichu	Taichung	臺中
Taiheizan, Taihezan, Taiheisan	Yilan: Taiping Mountain (Taipingshan)	宜蘭：太平山
Taihoku	Taipei	臺北
Tainan	Tainan	臺南
Taito, Taitocho	Taitung	臺東
Takao, Takaoshu	Kaohsiung	高雄
Toran	Taitung: Dulan (Doulan)	臺東：都蘭
Urai	New Taipei City: Wulai	新北市：烏來

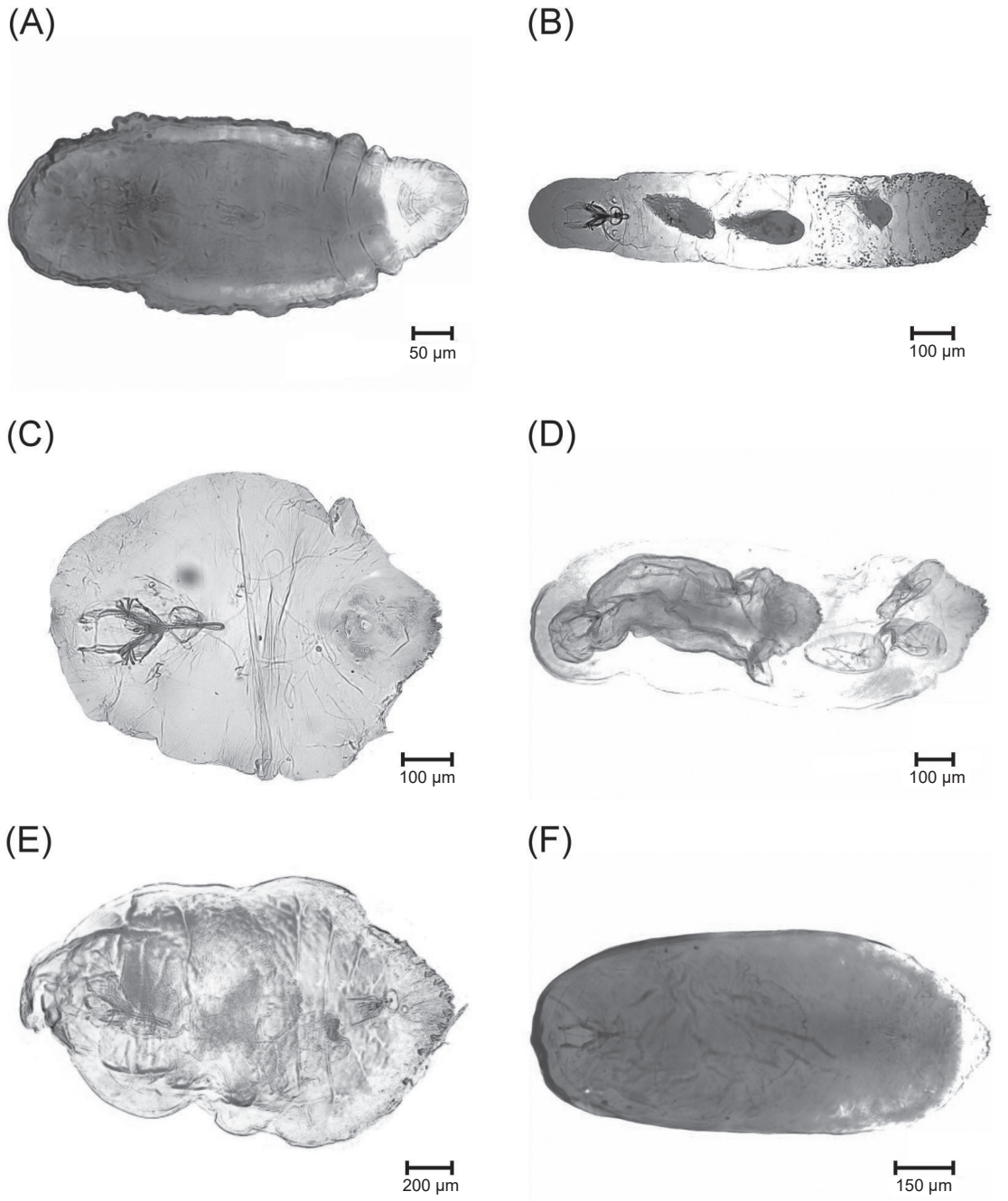

Fig. 1. (A) *Fiorinia ficicola* (Takahashi, 1931); (B) *Fiorinia fioriniae* (Targioni Tozzetti, 1867); (C) *Fiorinia formosensis* Takahashi, 1933; (D) *Fiorinia hisakakii* Takahashi, 1936; (E) *Fiorinia horii* Kuwana, 1927; and (F) *Fiorinia japonica* Kuwana, 1902.

Fiorinia horii Kuwana, 1927 (Fig. 1E)

(Kuwana 1927; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia horii* Kuwana. (3 slides)

Location data on the slides: Japan (Honshu: Tokyo); Taiwan (Nantou: Hori; Taichu: Rirei near Kurasu).

Host plant recorded on the label: *Hymenanthes* sp., *Rhododendron* sp. (Ericaceae).

Fiorinia japonica Kuwana, 1902 (Fig. 1F)

(Kuwana 1902; Ferris 1921; Tao 1989, 1999; Wong *et al*. 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

(1) **Original spelling on the label:** *Fiorinia fioriniae japonica* Kuw. (2 slides)
Location data on the slides: Taiwan (Taihoku).

(2) **Original spelling on the label:** *Fiorinia japonica* Kuwana. (9 slides)
Location data on the slides: Taiwan (Taihoku: Maruyama, Taihoku, Taipei).

(3) **Original spelling on the label:** *Fiorinia juniperi* Leon. (4 slides)
Location data on the slides: Japan (Okinawa: Naha); Taiwan (Taihoku; Tainan).

Host plant recorded on the label: *Pinus* sp., *Keteleeria* sp. (Pinaceae); *Podocarpus* sp. (Podocarpaceae).

Syn.: *Fiorinia fioriniae japonica* Kuwana, 1902; *Fiorinia juniperi* Leonardi, 1906.

Fiorinia minor Maskell, 1897 (Fig. 2A)

(Maskell 1897b; Ferris 1921; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia chinensis* Ferris. (9 slides)

Location data on the slides: Taiwan (Giran: Dakusui, Kinnos near Nano; Taihoku).

Host plant recorded on the label: *Celtis* sp. (Ulmaceae); *Ficus* sp. (Moraceae).

Syn.: *Fiorinia camelliae minor* Maskell, 1897; *Fiorinia fioriniae minor* (Maskell, 1897); *Fiorinia chinensis* Ferris, 1921.

Fiorinia payaoensis Takahashi, 1942 (Fig. 2B)

(Takahashi 1942; Borchsenius 1966; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia payaoensis* Takah. (6 slides)

Location data on the slides: Thailand (Paiao; Paiyao; Payao).

Note: Syntypes, female (Thailand: Payao, north of Lampang, on undetermined tree, 16-IV-1940 by R. Takahashi (#29-1-1-1~29-1-2-1)).

Fiorinia pinicola Maskell, 1897 (Fig. 2C)

(Maskell 1897a; Borchsenius 1966; Tao 1989; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia pinicola* Maskell. (1 slide)

Location data on the slides: Japan (Hokkaido: Sapporo).

Host plant recorded on the label: *Abies sachalinensis* (Pinaceae).

Syn.: *Fiorinia camelliae* (Maskell, 1898) (incorrect synonymy); *Fiorinia pruinosa Ferris*, 1950; *Fiorinia junipericola* Borchsenius, 1966.

Fiorinia proboscidaria Green, 1900 (Fig. 2D)

(Borchsenius 1966; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia proboscidaria* Green. (8 slides)

Location data on the slides: Taiwan (Heito: Kuraru; Kagi; Shoka: Inrin; Taito: Kakayo).

Host plant recorded on the label: *Citrus* sp., *Citrus tachibana*, Lemon (Rutaceae); *Syzygium jambos* (Myrtaceae).

Fiorinia randiae Takahashi, 1934 (Fig. 2E)

(Takahashi 1934; Borchsenius 1966; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia randiae* Takah. (3 slides)

Location data on the slides: Taiwan (Nantou: Hori, Suisha)

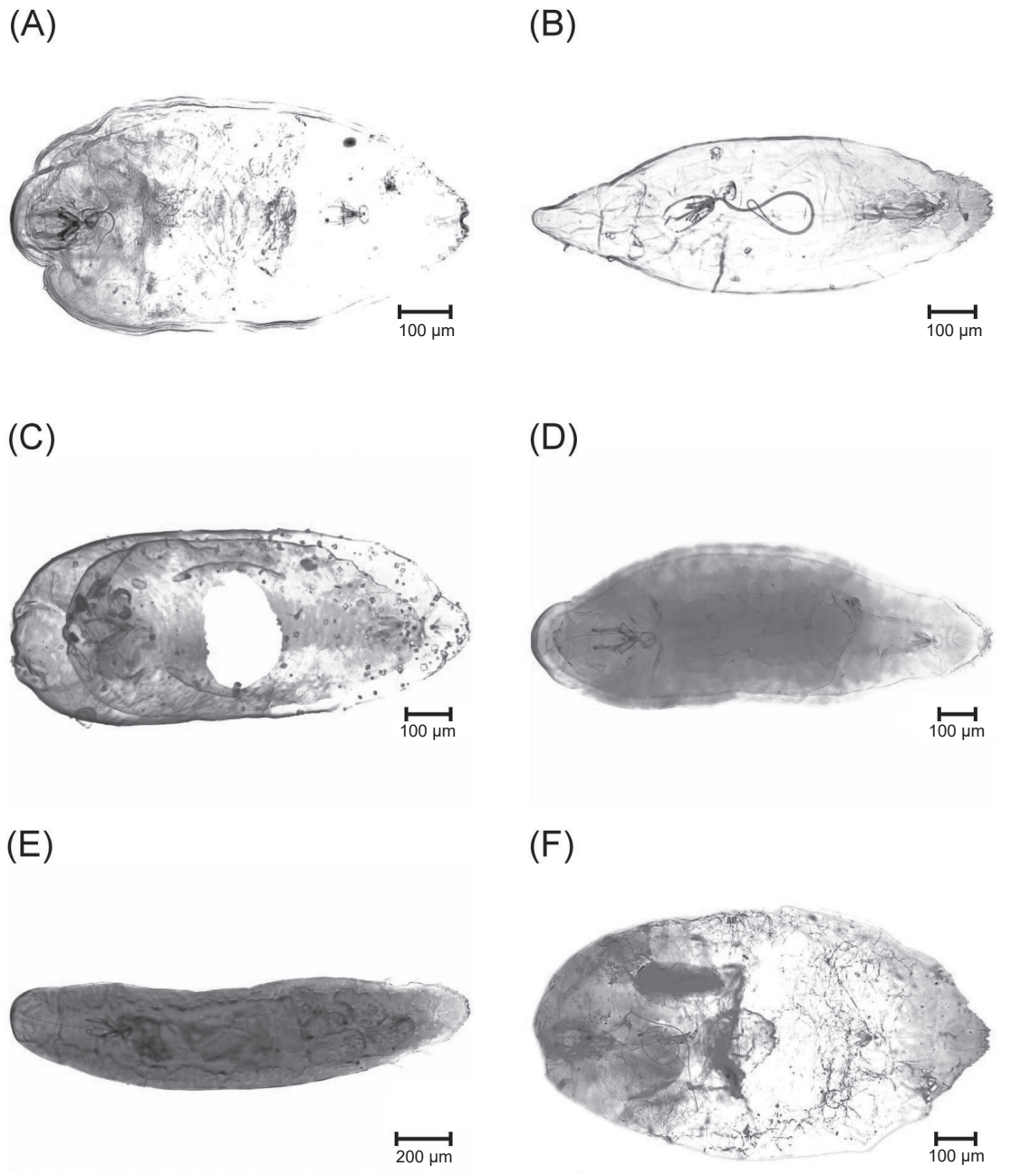

Fig. 2. (A) *Fiorinia minor* Maskell, 1897; (B) *Fiorinia payaoensis* Takahashi, 1942; (C) *Fiorinia pinicola* Maskell, 1897; (D) *Fiorinia proboscidaria* Green, 1900; (E) *Fiorinia randiae* Takahashi, 1934; and (F) *Fiorinia saprosmae* Green, 1896.

Host plant recorded on the label: *Randia canthioides* (Rubiaceae).

Syn.: *Fiorinia proboscidaria randiae* Takahashi, 1934.

Note: Syntypes, female (collected from Taiwan: Hori, on *Randia canthioides*, 10-VI-1933, by R. Takahashi (#29-3-1-1~2)).

Fiorinia saprosmae Green, 1896 (Fig. 2F)

(Green 1896; MacGillivray 1921; Borchsenius 1966; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia saprosmae* Green. (5 slides)

Location data on the slides: Sri Lanka (Ceylon); Taiwan (Taito: Kotosho).

Host plant recorded on the label: *Ficus* sp. (Moraceae).

Syn.: *Trullifiorinia saprosmae* (Green, 1896).

Fiorinia smilaceti Takahashi, 1931 (Fig. 3A)

(Takahashi 1931a; Borchsenius 1966; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia smilaceti* Tak. (13 slides)

Location data on the slides: Taiwan (Taihoku: Hinokiyama, Shinten, Sozan).

Host plant recorded on the label: *Lindera* sp. (Lauraceae); *Smilax* sp. (Smilacaceae).

Note: Syntypes, female (collected from Taiwan: Shinten, on *Smilax* sp., I-1927, by R. Takahashi (#29-2-2-2 ~29-2-3-4)).

Fiorinia taiwana Takahashi, 1934 (Fig. 3B)

(Takahashi 1934; Borchsenius 1966; Tao 1989; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia taiwana* Takah. (17 slides)

Location data on the slides: Japan (Loochoo: Naze); Taiwan (Nantou: Habon; Taihoku: Shirin, Sozan; Taito: Kaho, Toran; Takao).

Host plant recorded on the label: *Ficus* sp. (Moraceae); *Maesa* sp., *Myrica rubra* (Myricaceae); *Piper* sp. (Piperaceae); *Quercus* sp., *Quercus glauca* (Fagaceae); *Sageretia theezans* (Rhamnaceae).

Note: Syntypes, female (collected from Taiwan: Taihoku; Shirin; Sozan, on *Quercus glauca* and *Myrica rubra*, 11-X-1931, by R. Takahashi (#29-3-2-2~5、#29-3-3-1~5)).

Fiorinia theae Green, 1900 (Fig. 3C)

(Green 1900; Borchsenius 1966; Tao 1989; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia theae* Green. (11 slides)

Location data on the slides: China (Shanghai); Hozan; Taiwan (Giran: Taihezan; Heito: Mutosan; Nantou: Musha; Taihoku: Hinokiyama; Tainan: Mato).

Host plant recorded on the label: *Citrus* sp. (Rutaceae); *Eurya* sp., *Thea* sp. (Theaceae).

Fiorinia turpiniae Takahashi, 1934 (Fig. 3D)

(Takahashi 1934; Ferris 1950; Borchsenius 1966; Tao 1989, 1999; García Morales *et al*. 2016; Liu *et al*. 2020)

Original spelling on the label: *Fiorinia turpiniae* Takah. (2 slides)

Location data on the slides: Taiwan (Taichu: Kahodai).

Host plant recorded on the label: *Turpinia formosana* (Staphyleaceae).

Syn.: *Fiorinia theae turpiniae* Takahashi, 1934.

Note: Syntypes, female (collected from Taiwan: Kahodai near Hassenzan, on *Turpinia formosana*, 06-VI-1933, by R. Takahashi (#29-5-1-1~2)).

Thysanofiorinia nephelii (Maskell, 1897) (Fig. 3E)

(Maskell 1897a; MacGillivray 1921; Balachowsky 1954; Tao 1989, 1999; Wong *et al*. 1999; García Morales *et al*. 2016)

Original spelling on the label: *Fiorinia nephelii* Mask. (8 slides)

Location data on the slides: Taiwan (Kagi; Taihoku: Maruyama); Thailand (Bangkok).

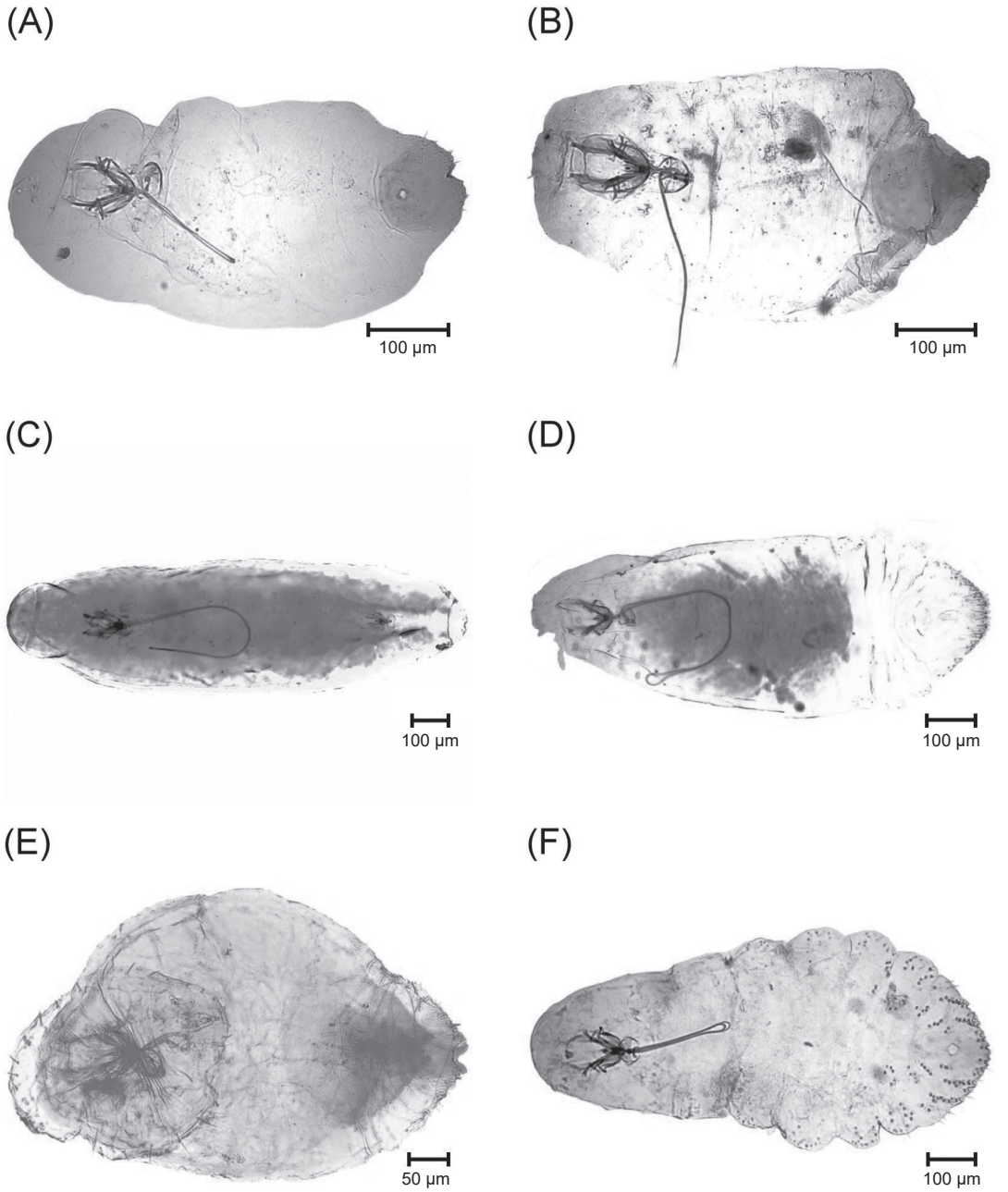

Fig. 3. (A) *Fiorinia smilaceti* Takahashi, 1931; (B) *Fiorinia taiwana* Takahashi, 1934; (C) *Fiorinia theae* Green, 1900; (D) *Fiorinia turpiniae* Takahashi, 1934; (E) *Thysanofiorinia nephelii* (Maskell, 1897); and (F) *Unachionaspis bambusae* (Cockerell, 1896).

Host plant recorded on the label: *Euphoria longana*, *Dimocarpus longan* (Sapindaceae); *Annona* sp. (Annonaceae).

Syn.: *Fiorinia nephelii* Maskell, 1897; *Fiorinia hirsuta* Marchal, 1906; *Parafiorinia hirsuta* (Marchal, 1906); *Parafiorinia nephelii* (Maskell, 1897); *Fiorinia* (*Adiscofiorinia*) *nephelii* (Maskell, 1897).

Unachionaspis bambusae (Cockerell, 1896) (Fig. 3F) (Cockerell 1896; Takagi 1961; Borchsenius 1966; Tao 1999; García Morales *et al*. 2016)

Original spelling on the label: *Chionaspis bambusae* Ckll. (1 slide)

Location data on the slides: Japan.

Host plant recorded on the label: *Bambusa* sp. (Poaceae).

Syn.: *Chionaspis bambusae* Cockerell, 1896.

Unachionaspis signata (Maskell, 1897) (Fig. 4A) (Maskell 1897a; Kuwana 1902; MacGillivray 1921; Borchsenius 1966; García Morales *et al*. 2016)

Original spelling on the label: *Chionaspis signata* Maskell. (2 slides)

Location data on the slides: Japan (Kyoto).

Host plant recorded on the label: *Bambusa* sp. (Poaceae).

Syn.: *Fiorinia signata* Maskell, 1897; *Chionaspis colemani* Kuwana, 1902; *Chionaspis signata* (Maskell, 1897); *Unachionaspis colemani* (Kuwana, 1902).

Unachionaspis tenuis (Maskell, 1897) (Fig. 4B) (Maskell 1897a; Takahashi 1936; Takahashi & Tachikawa 1956; Borchsenius 1966; García Morales *et al*. 2016)

Original spelling on the label: *Chionaspis sakaii* Takah. (3 slides)

Location data on the slides: Japan (Kyushu: Nishino-Omote Machi, Tanegashima).

Host plant recorded on the label: *Bambusa* sp. (Poaceae).

Syn.: *Fiorinia tenuis* Maskell, 1897; *Kuwanaspis tenuis* (Maskell, 1897); *Chionaspis sakaii* Takahashi, 1936.

DISCUSSION

Based on the modern taxonomic system, 20 Fioriniinae species have been collected and deposited at the TARI Insect Collection. The present paper could be a database to set up the information on scientific names, synonyms, host plants, distribution, and digital archives which will meet the requirements of both basic and applied works and will be helpful to tax-

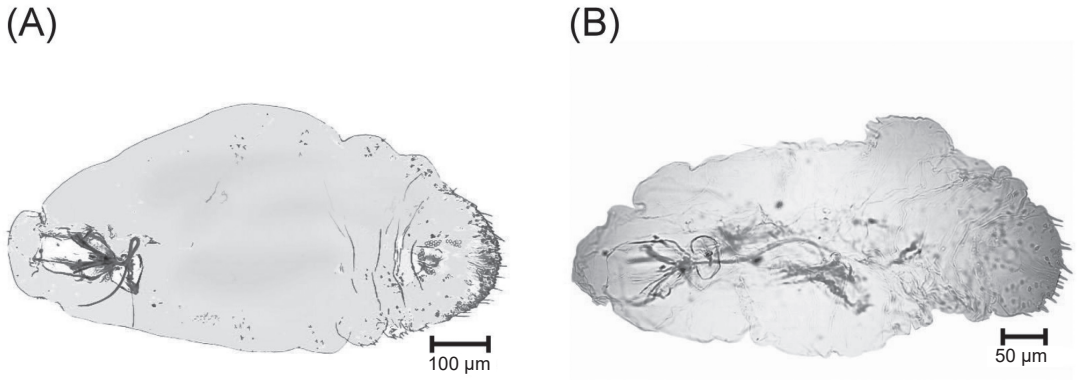

Fig. 4. (A) *Unachionaspis signata* (Maskell, 1897); and (B) *Unachionaspis tenuis* (Maskell, 1897).

onomic researchers, quarantine inspectors and farmers in the future.

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農業試驗所昆蟲標本館 (4)-圍盾介殼蟲亞科 (半翅目：介殼蟲總科：盾介殼蟲科) 標本名錄

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摘要

陳淑佩、翁振宇、古琇芷。2025。農業試驗所昆蟲標本館 (4)-圍盾介殼蟲亞科 (半翅目：介殼蟲總科：盾介殼蟲科) 標本名錄。台灣農業研究 74(1):25–36。

本文羅列 3 屬 20 種 (145 片玻片標本) 農業試驗所館藏之圍盾介殼蟲亞科 (Fioriniinae) [半翅目 (Hemiptera)：介殼蟲總科 (Coccoidea)：盾介殼蟲科 (Diaspididae)] 名錄，其中亦包含異名、寄主植物、採集資料及標本形態圖等資料。

關鍵詞：圍盾介殼蟲亞科、高橋良一、台灣。

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